Working With Nature

Introduction

The desire for a high quality of life includes a high quality environment in which to live and work. As part of a large metropolitan region, Howard County will continue to develop, but this does not mean that unnecessary losses of landscape resources and environmental quality must be accepted.

One way to protect such resources is to set them aside as parks, open space or conservation easements. Practically and financially, this can only be done for the most valuable or sensitive resources. The crucial problem is how to protect environmental and landscape resources within developed areas – in neighborhoods, office parks, and commercial, manufacturing and warehouse areas. The following goals are central to realizing the General Plan vision for this chapter:

Vision 5:

Our environmental resources will be protected, used wisely and restored to health.

Protect natural resources. Public acquisition, easements and regulations are tools for protecting Howard County's river and stream valleys, wetlands, floodplains, steep slopes, forests and wildlife habitats. The natural resource protection policies of this Plan focus on water resources, forests and contiguous tracts of undisturbed natural environments.

Restore natural resources. Many areas of the County were developed before current protections were in place, and much of the original streamside tree cover, wetlands and buffers were lost. Restoring these elements will do much to improve water quality and reestablish ecological continuity along these streams.

Connect protected natural areas in a comprehensive greenway network. A greenway network can sustain critical ecosystem functions and link valued natural, historic and cultural resources. Such a network can provide continuous protected areas along streams and rivers, create habitat and travel corridors for wildlife, connect existing forest areas to create forest interior habitat, and provide areas for public access and recreation.

Encourage resource conservation. Because of the broad scope of this topic, some actions are addressed in other chapters (increasing the proportion of solid waste that is recycled, improving opportunities for bicycle or pedestrian travel, and encouraging use of transit and ridesharing). This chapter addresses possible strategies for providing more energy efficient development and retaining or enhancing environmental resources through land use planning, site design and management of developed areas.

State Planning Mandates

In 1983, Maryland became a signatory to the Chesapeake Bay Agreement (the Agreement) and pledged to help clean up and restore the Chesapeake Bay. In 1987 and 2000, the Agreement was revisited and strengthened by adding specific goals and actions for restoring the Chesapeake Bay. With the 1987 renewal, the focus for action moved beyond the shoreline of the Bay to focus on actions needed throughout the Bay's watershed. The 2000 Agreement continues to recognize that the health of the Bay is dependent on the health of its entire watershed and promotes an ecosystem-based approach to resource protection throughout the watershed.

Four of the eight visions of the amended 1992 Planning Act specifically address protection of the State's natural resources:

- Sensitive areas are protected;
- In rural areas, growth is directed to existing population centers and resource areas are protected;
- Stewardship of the Chesapeake Bay and the land is a universal ethic; and
- Conservation of resources, including a reduction in resource consumption, is practiced.

The methods by which western Howard County can remain largely rural and the environmental protection issues specific to the West are covered in detail in Chapter 3, *Preservation of the Rural West*. This chapter focuses on land use problems in the County's suburban development areas that must be resolved if the County is to realize these visions.

In 1999, to better establish environmental protection as a central County function, the County created a new Division of Environmental and Community Planning within the Department of Planning and Zoning. The Division's mission is to formulate and implement plans that foster the conservation of environmental resources and the enhancement of the County's communities.

Environmental Stewardship

Individual stewardship of the land is essential to meet resource protection goals because the majority of the land in the County is privately owned and already developed. If streams and wetlands are to be restored, forests replanted, and resources conserved and protected for future generations, individual land owners must be willing participants. Public outreach and education are important to raise awareness about the cumulative positive or negative impacts individual lifestyle choices can have on the environment. The County can encourage individual stewardship by informing citizens about resource protection agencies and programs that offer assistance.

Policies and Actions

POLICY 6.1: Encourage individual environmental stewardship.

- ***Environmental Stewardship Education.*** Conduct public outreach and education to encourage individuals both to be good stewards of their own property and to participate in community environmental enhancement efforts.

Waterways and Wetlands

Streams and Rivers

Howard County lies within the watersheds of two major tributaries to the Chesapeake Bay – the Patuxent and the Patapsco Rivers. Approximately three-quarters of Howard County lies within the Patuxent watershed and the remaining quarter lies within the Patapsco watershed (Map 6-1).

The main stems of these rivers have many tributary streams which drain large areas of the County. Numerous smaller streams feed into the main stems and tributary streams. These streams are often associated with wetlands and are contained within narrow valleys defined by adjacent steep slopes. Stream valleys are extensive and encompass many of the most important of the County's natural resources – the waterways themselves, wetlands, floodplains, forests, adjacent steep slopes and wildlife habitats (Map 6-2). Degradation of any of these elements harms the environmental and landscape integrity of the others.

Much of the land along the main stems and key eastern tributary streams of the Patuxent and the Patapsco is now under permanent public ownership, but significant gaps exist. Ownership of land adjacent to western tributary streams and feeder streams is generally private.

The 1992 Planning Act requires that local governments adopt a Sensitive Areas element in their Comprehensive Plans. This element requires protection of four sensitive environments – streams and buffers, 100-year floodplains, steep slopes, and habitats for threatened and endangered species.

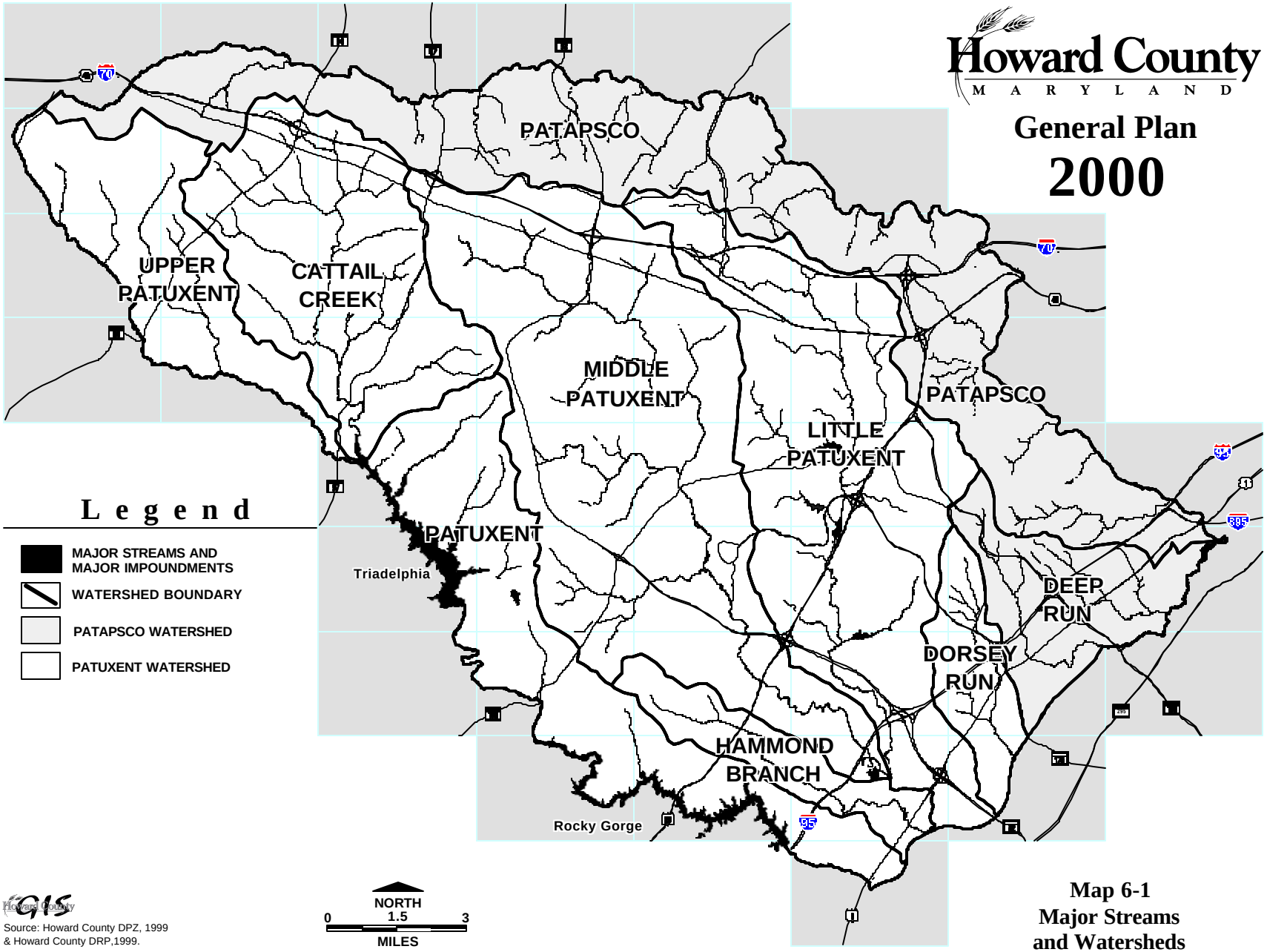
County regulations adopted in December 1988 require undisturbed streamside buffer areas of 75 feet along perennial streams within residential zoning districts. In 1992, regulations were added to require undisturbed streamside buffers of 50 feet along intermittent streams and along perennial streams in non-residential zoning districts. In 1988, Howard County also instituted wetland protection by requiring a 25-foot undisturbed buffer around nontidal wetlands. Additionally, most wetlands in the County are found within the 100-year floodplain, and the County has prohibited development within the 100-year floodplain since the 1970s.

The effectiveness of stream and wetland buffers depends on the buffer width, vegetation and management practices. To provide the greatest benefit, buffers should be wide enough to allow adequate filtering of overland runoff and include adjacent, steep slopes and highly erodible soils. A forested buffer provides the greatest benefits in terms of filtering pollutants, nutrient uptake through plant roots, erosion prevention, species habitat and shading to keep water temperatures cool. Current buffer requirements could be strengthened to enhance protection of streams and wetlands. This could include increasing buffer width requirements, ensuring that buffers are located in open space or within protective easements and, if possible, establishing buffers on lands that are not addressed through the subdivision review process.

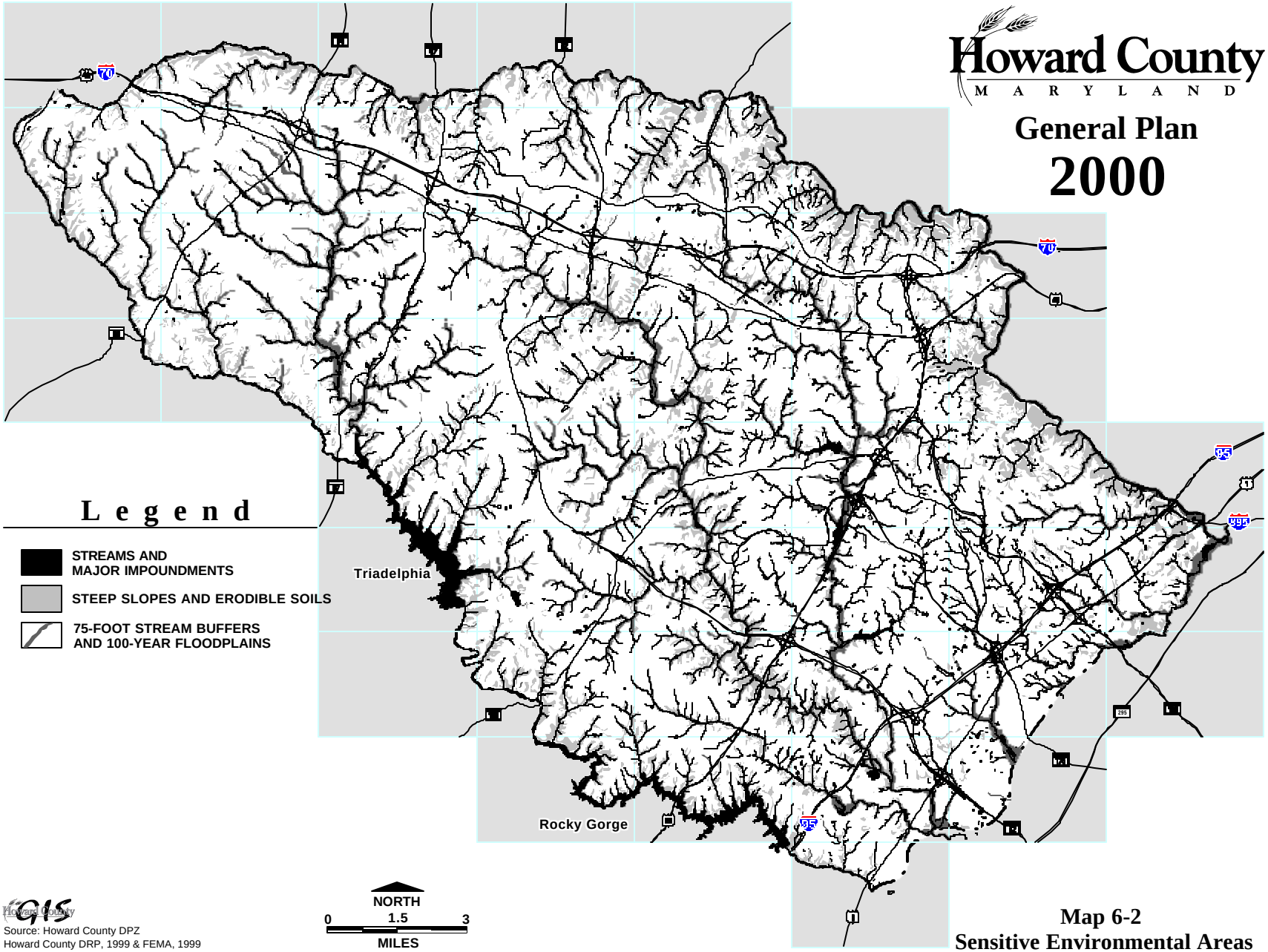
Since 1989, County regulations have prohibited the disturbance of larger areas of steep slopes, which are defined as contiguous areas greater than 20,000 square feet, with a slope of 25% or greater. Steep slope areas often provide diverse, unique habitats for a variety of plant and animal species. Disturbance of these areas generates excessive erosion and sedimentation that can be difficult to prevent even with enhanced sediment and erosion control practices. Once disturbed, steep slopes are often difficult to stabilize. When steep slopes occur in conjunction with erodible soils, these erosion and sedimentation problems are intensified. There are currently no protections for highly erodible soils in areas of less than a 25% slope. It is particularly important to protect steep slopes and erodible soils when they are adjacent to water resources because of the increased potential for direct harm to water quality and habitat.

Migratory Fish and Native Trout

Historically, the Patuxent and Patapsco Rivers provided spawning grounds for migratory or anadromous fish throughout their reach. However, populations of migratory fish declined significantly throughout the Chesapeake Bay during the 1970s and 1980s. This decline resulted from a combination of factors, including pollution and siltation of spawning areas, overharvesting, and construction of dams and other obstructions which prevented the fish from returning to historic spawning grounds.



Map 6-1
Major Streams and Watersheds



Map 6-2
Sensitive Environmental Areas

The 2000 Chesapeake Bay Agreement reaffirms the 1987 Agreement's commitment to restore the Bay's fisheries, including restoring passage for migratory species. The Maryland Department of Natural Resources (DNR) has removed or modified dams and other obstructions on the Patuxent and Patapsco Rivers. However, the DNR has no current plans to address the dams for the Rocky Gorge and Triadelphia Reservoirs, which are major blockages on the upper Patuxent River, or blockages on streams above these dams in the Patuxent reservoirs watershed.

The upper reaches of the Patuxent and Patapsco Rivers in Howard County support native trout populations. Wild trout require streams with cool, well-oxygenated water and a gravel stream bed with little sediment, so the presence of trout indicates very good water quality and habitat conditions. Trout also support an important recreational sport.

The removal of fish passage blockages not only helps migratory fish species, but also contributes to the health of resident fish species by allowing resident species a greater range of habitat. Possible fish passage blockages have been identified by the County in the Patuxent reservoirs watershed; however, an assessment of the significance of these blockages and their potential for removal has not been conducted.

Patuxent Reservoirs

The Rocky Gorge and Triadelphia Reservoirs, located along Howard County's southern boundary, supply water for the region's public water systems. Approximately half of the watershed for these reservoirs lies within Howard County, and the remainder lies predominantly within Montgomery County. As a signatory to the 1996 Patuxent Reservoirs Watershed Protection Agreement, the County works with neighboring jurisdictions and the Washington Suburban Sanitary Commission to protect the health of this watershed.

An important tool to protect water resources is to limit the amount and intensity of development within a watershed, because this limits land disturbance, vegetative removal and impervious cover. In particular, the use of land closest to a water body can have a significant impact on its water quality. This is because pollutants generated from the land have little time to be filtered, treated or diluted before entering the water.

The majority of land within the Patuxent reservoirs watershed is zoned Rural Conservation (RC) and Rural Residential (RR), with a Density Exchange Option (DEO) Overlay District. Developments in the RC and RR Districts are served by individual septic systems. Septic systems are not effective at removing nitrogen from the treated effluent, but little is known about the site-specific impacts from septic system loadings to groundwater and, subsequently, to surface water.

To better protect the reservoirs, the County recently amended the Zoning Regulations to prohibit density exchange to lands within 2,500 feet of the normal water level of the reservoirs. An assessment of the Zoning and the Subdivision and Land Development Regulations may provide additional opportunities to enhance protection of the Patuxent reservoirs. This may include promoting density exchange away from lands directly adjacent to the reservoirs and ensuring that preservation parcels created through the rural cluster subdivision process are located to enhance the existing buffer adjacent to the reservoirs.

Watershed Planning and Management

The health of streams is directly linked to the use of land within their watersheds. For this reason, a holistic approach to protecting, restoring and improving streams should be based on a comprehensive assessment of land use, water quality and habitat conditions for the entire watershed. Watershed-based plans also provide a framework to address other resource issues such as forest and wildlife habitat protection and creation in an integrated, comprehensive manner.

The multistate effort to restore the Chesapeake Bay has been and continues to be a strong influence in promoting watershed-based planning and management efforts to protect not only the Bay, but also the Bay's numerous tributary rivers and streams. The Bay restoration effort has been predominantly focused on achieving a goal of the 1987 Agreement to reduce nitrogen and phosphorus loadings to the Bay by 40%, using 1985 as a baseline year. This reduction is to be achieved by 2000 and then held as a cap on subsequent loadings to the Bay.

In 1992, the 1987 Agreement was amended to apportion this 40% reduction among each of the Bay's major tributary watersheds. In Maryland, nutrient reduction strategies were developed for each of the State's ten major tributary watersheds. These Tributary Strategies include diverse efforts such as improving treatment processes at wastewater treatment plants, installing agricultural best management practices, retrofitting stormwater management facilities and planting buffers.

In 1995, Governor Glendening appointed a Tributary Team for each watershed to coordinate State and local efforts to implement the strategy. The Tributary Teams are made up of representatives of the business and agricultural communities, environmental organizations, State and local governments and agencies, and private citizens. Howard County participates in the Tributary Team for the Patapsco River and the Patuxent River Commission, which is the Tributary Team for the Patuxent River.

The 2000 Chesapeake Bay Agreement reaffirms the 40% nutrient reduction commitment and further commits to define the additional nutrient and sediment reductions necessary to protect aquatic living resources in the Bay and its tributaries. The Tributary Strategies will be revised to achieve and maintain these new loading goals.

The County has only recently begun conducting watershed studies to develop basic information on water quality and habitat conditions in local streams. The County is currently conducting a comprehensive assessment for the Patuxent reservoirs watershed, which will direct future efforts for more detailed subwatershed studies, and more limited studies in the Little Patuxent River, Deep Run and Tiber-Hudson watersheds. These more limited studies have focused primarily on stream corridor conditions.

A comprehensive approach to protect, restore and improve the County's water resources involves analyzing conditions and designing and implementing improvements on a systematic, watershed basis. A watershed management plan should be developed for each watershed in the County (as shown previously on Map 6-1) to characterize existing watershed conditions, establish restoration objectives, identify restoration options, evaluate implementation feasibility and prioritize restoration projects. For larger watersheds, such as the Little Patuxent River watershed, it may be preferable to prepare plans for smaller, more manageable subwatershed units.

Watershed protection and restoration goals may vary by watershed in relation to existing stream conditions and current and future land use. For example, in a watershed with a healthy stream system, the goal may be to protect and maintain current conditions through appropriate best management practices, while in a watershed with a degraded stream system, the goal may be to actively restore and improve conditions. Watershed management plans should be used as a tool to guide development review to ensure protection of sensitive resources. To ensure watershed goals are being met, all watershed management plans should be completed, then revisited and updated as needed, on a regular cycle.

It is especially important that areas along streams that have already been disturbed, that have limited buffers or that are cut off from other natural stream corridors be restored and enhanced. Many areas in the East were developed before current protections were in place, and much of their original tree cover, wetlands and streamside buffers were lost. Restoring these elements will do much to improve water quality and reestablish ecological continuity along these streams. Community planning, as described in Chapter 5, *Community Conservation and Enhancement*, is also a means to identify restoration opportunities and involve communities in stewardship activities.

Watershed-based planning will also provide a framework for the County to coordinate environmental expertise and environmental protection among the various County agencies. An example of this approach can be seen in Montgomery County's Countywide Stream Protection Strategy, which assigned watersheds to specific management categories, based on existing conditions and current and future land use. These management categories and their associated management tools are used to target interagency resources to address stream restoration efforts.

Watershed-based planning could also help the County address the regulatory requirements of the Federal Clean Water Act. One such requirement is the Total Maximum Daily Load (TMDL). TMDLs require an assessment of the total point and nonpoint source pollutant loads to a water body and a

management plan to bring the water body into compliance with water quality standards for each pollutant that exceeds the standards. Management plans may apportion loads among the various pollutant sources in the watershed and may require a reduction or a cap on the amount of pollutant produced. In the past, Federal oversight of State actions to comply with the Clean Water Act allowed the TMDL requirement to be addressed indirectly. More direct, formal compliance has only recently moved forward, so the impacts of TMDL management plans on future growth and watershed restoration efforts remain uncertain.

Stormwater Management

Since 1974, Howard County has required stormwater management to mitigate some of the environmental impacts caused to water bodies by development. The original impetus for stormwater management was to control the increased rate of runoff flow generated by development, to reduce damage from flooding and to prevent stream channel erosion.

Stormwater runoff also carries many pollutants from the land, including oil, grease and metals from roads and driveways; sediment, fertilizers and pesticides from lawns and agricultural fields; and nutrients and metals deposited from air pollution. These pollutants degrade water quality and habitat in our local streams and, subsequently, in the Chesapeake Bay.

As more is learned about the negative impacts stormwater runoff can have on water quality and habitat conditions in waterways, the requirements for stormwater management have increased. Federal, State and local regulations for stormwater management have been expanded to add pollutant removal requirements.

Stormwater management requirements are currently undergoing a shift at the State level towards a new approach that seeks to better integrate stormwater management design into site design. The new approach emphasizes reducing the amount of stormwater runoff generated through site design techniques. Runoff that is generated is treated by a number of small facilities located throughout a site, rather than collecting and channeling all runoff to one or two large facilities. This new approach, often known as low impact development, is intended to better maintain pre-development runoff patterns and provide additional water quality protections for streams.

Low impact development can include: using cluster development and reducing road widths and parking requirements to limit site disturbance and impervious surfaces; preserving sensitive natural areas such as forests and nontidal wetlands; directing runoff from impervious surfaces such as rooftops to pervious surfaces such as lawns, to slow the flow of runoff and allow the runoff to filter through vegetation and soak back into the ground; and building smaller, on-site quality treatment facilities often called bioretention facilities. Bioretention facilities are small holding areas that treat runoff through natural processes, including soil filtration and nutrient uptake by vegetation.

The State is also moving towards strengthening stormwater management requirements for redeveloping sites. Requiring stormwater management for redevelopment sites offers an important opportunity to improve water quality and quantity controls for stormwater runoff in areas that were developed prior to current stormwater management regulations. However, redevelopment sites are often very constrained, making it difficult to design effective stormwater management.

As a requirement of the Federal Clean Water Act, Howard County has obtained a National Pollutant Discharge Elimination System (NPDES) permit for discharges from the County's stormwater management system. The NPDES permit has significant requirements for maintaining and improving the County's stormwater management system. Improvements to stormwater management systems can include retrofits of existing facilities to add water quality treatment and building new facilities to serve older areas built without stormwater management. NPDES permit requirements have placed and will continue to place substantial staff and financial demands on the County.

Older areas of the County often require specialized stormwater management studies to address unique conditions and site constraints. Densely developed older areas were largely developed prior to stormwater management requirements. In addition, development has often occurred in the 100-year floodplain; furthermore, most of the streams in the County are

privately owned. These constraints mean there is a lack of available land to install drainage systems and stormwater management facilities, so planning, land acquisition and construction become difficult, time-consuming and expensive.

The County's NPDES stormwater discharge permit for 2000-2005 includes new requirements for watershed restoration. Within the time frame of the permit, the County must prioritize all watersheds in the context of water quality, complete assessments on two watersheds and begin restoration for one watershed. In addition to stormwater management, restoration activities can include a variety of actions, such as reducing the application of fertilizers, pesticides and herbicides, planting forested buffers along streams, creating wetlands, stabilizing stream channels and restoring instream habitat. These improvements will not only provide environmental benefits for local streams and rivers and the Chesapeake Bay, but they will also help the County address flooding concerns for roads and older neighborhoods.

Stormwater management systems must be regularly inspected and maintained and, as they age, deteriorated systems must be upgraded or replaced. The County is required by both State and local legislation to conduct regular inspections of stormwater management facilities.

In general, the County shares maintenance responsibilities with homeowners associations for residential facilities, while non-residential facilities are privately maintained. There are increasing concerns that the owners of privately maintained facilities may not be aware of their responsibilities or be financially prepared for the long-term maintenance and replacement costs associated with these facilities. The County may need to enforce these private party maintenance responsibilities, which could be very time-consuming, costly and contentious.

The County should prepare fiscal and budget analyses of projected future inspections and maintenance costs and evaluate current policies assigning private and public maintenance responsibilities, including an evaluation of policies on ownership. These analyses should be used to assess whether changes to current policies would improve or decrease the County's ability to maintain and improve the stormwater management system, and how any changes would impact the County's costs.

Currently, stormwater management is at a competitive disadvantage for funding when compared with other more widely recognized areas of public need such as schools and roads. To assure adequate and sustained funding for the stormwater management program, funding options should be reexamined, including the possibility of a dedicated fund.

All property owners are responsible for some degree of runoff, both from their individual properties and from public lands that serve the general public such as roads and schools. All property owners would benefit from a comprehensive watershed planning program to address stormwater management, flooding and water quality and habitat improvements in local streams. Therefore, a funding approach that would apply to all property owners should be considered.

In addition to local funding, the County should continue to pursue Federal and State grant and cost-share opportunities. Grant and cost-share programs can provide funding for activities such as watershed planning, wetland creation, stream channel restoration, riparian forest buffer plantings, public outreach and education, and stormwater management.

Policies and Actions

POLICY 6.2: Ensure the environmental integrity of streams and wetlands.

- ***Stream and Wetland Buffers.*** Strengthen buffer requirements to enhance protection of stream and wetland resources.
- ***Steep Slopes and Erodible Soils.*** Strengthen current steep slope protection requirements and institute protections for less steep but highly erodible soils, particularly in areas adjacent to water resources.

POLICY 6.3: Safeguard the environmental integrity of the Patuxent reservoirs.

- ***Patuxent Reservoirs Protection Regulations.*** Enhance protection of

the Patuxent reservoirs through appropriate changes to the Zoning and/or the Subdivision and Land Development Regulations.

- ***Interjurisdictional Patuxent Reservoirs Protection.*** Continue participation and leadership in interjurisdictional efforts to protect the Patuxent reservoirs, including the Patuxent River Commission and the 1996 Patuxent Reservoirs Watershed Protection Agreement.

POLICY 6.4: Restore and protect stream valley environments.

- ***Watershed Planning and Management.*** Prepare comprehensive watershed management plans for all watersheds, to guide efforts to protect, restore and improve the County's water resources. Complete and update all watershed management plans on a regular cycle.

- ***Restoration as a Component of Community Planning.*** Make restoration of degraded or threatened areas along streams a prime element of community planning efforts.

- ***Individual and Community Participation.*** Encourage active participation of individuals and local community and environmental organizations in restoration activities.

- ***Resources for Restoration.*** Pursue Federal and State grant and cost-share opportunities to secure additional resources for restoration efforts. Apply jointly with community and environmental organizations and with neighboring jurisdictions, as appropriate.

- ***Stormwater Management for Redevelopment.*** Strengthen the stormwater management requirements for redevelopment, in coordination with State requirements.

- ***Stormwater Management Retrofits.*** Ensure that the retrofit program adequately addresses stormwater management needs in older communities.

- ***Stormwater Management Program Funding.*** Ensure adequate and sustained funding for the stormwater management program.

- ***Migratory Fish and Trout.*** Work with the Maryland Department of Natural Resources to continue the removal of fish passage blockages, where feasible, including blockages within the Patuxent reservoirs watershed, if warranted.

Woodlands

Woodlands and Other Native Plant Communities

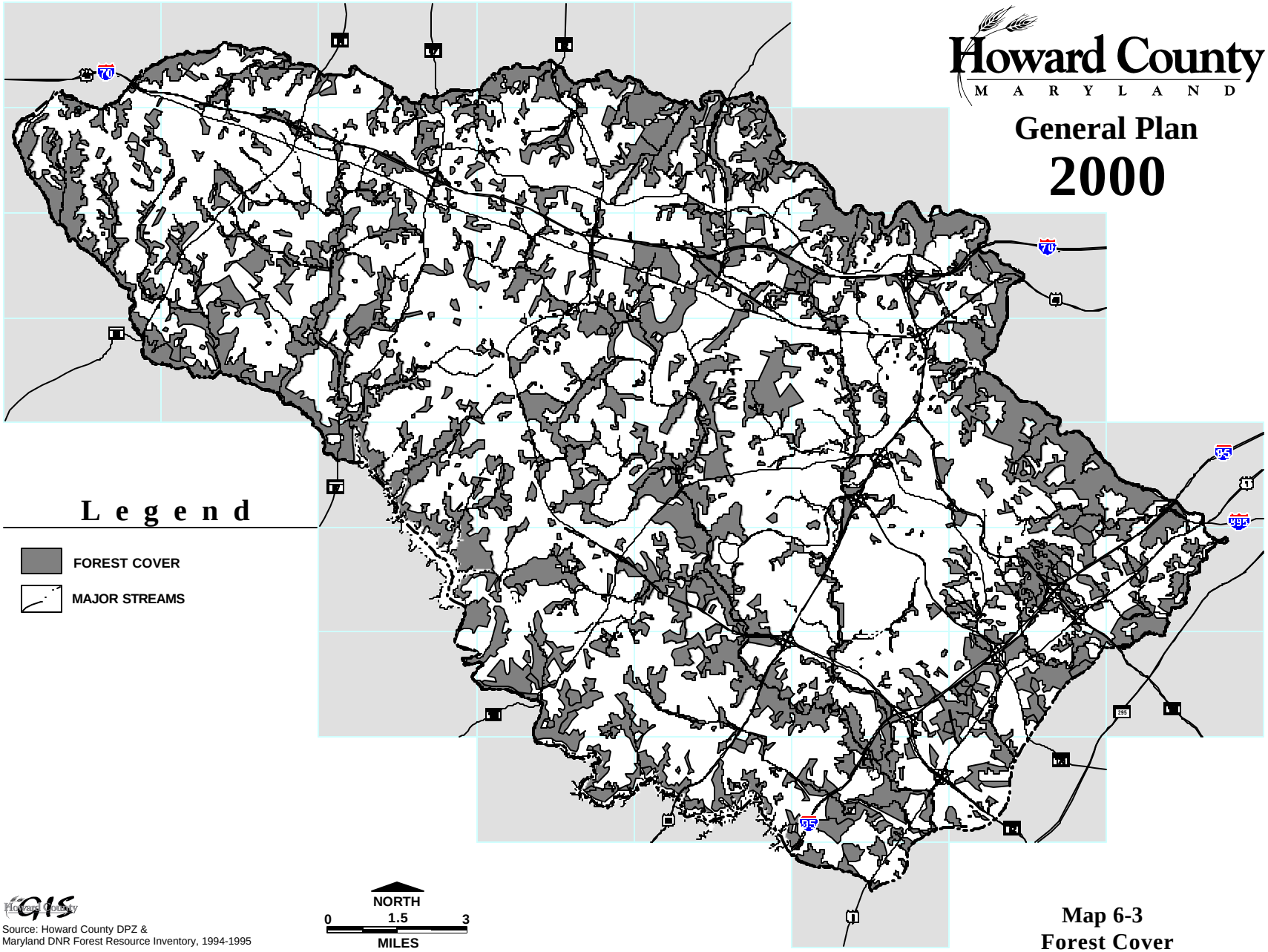
Mixed hardwood forest cover is the condition that would prevail in most of Howard County if nature were allowed to take its course. Agricultural practices were the main cause of the loss of the original forest cover in the County through the mid-20th century. Today, development for new homes, stores and workplaces poses the biggest threat to the remaining woodlands.

Woodlands are perhaps our most conspicuous and most easily appreciated environmental and landscape resource. When trees are cleared for development, the vulnerability of the environment in suburban areas is suddenly and starkly emphasized.

The Maryland Department of Natural Resources 1994-1995 Forest Resource Inventory indicates that the County has approximately 52,500 acres or one-third of the County in forest cover (Map 6-3). Woodlands in the East are prevalent primarily within stream valley areas where sensitive resources have discouraged development or where they have been included in publicly-owned conservation areas, such as the land surrounding the Patuxent reservoirs. In the West, upland and stream valley forests are more extensive than in the East.

Although there is a significant amount of forest cover left, continuing loss threatens this habitat. Scrub-shrub habitat, which is dominated by low-growing trees and shrubs, and grasslands are other plant communities that need protection.

Loss or destruction is not the only problem threatening our plant communities; loss of diversity, forest fragmentation and degradation by invasive exotic species are also concerns. Invasive exotic species are non-native



Source: Howard County DPZ &
Maryland DNR Forest Resource Inventory, 1994-1995

Map 6-3
Forest Cover

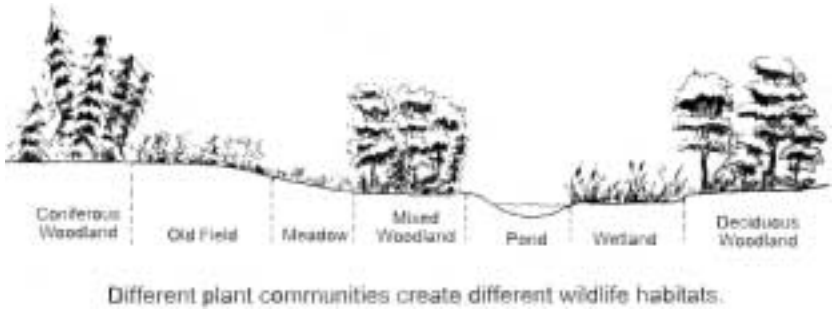
plants that pose a threat to native plant communities because their vigorous growth habit, prolific fruit or dense shade prevents desirable native plants from germinating.

There are many benefits derived from maintaining large tracts of undisturbed woodlands or other native vegetation within developments (Figure 6-1). Such stands help reduce stormwater runoff, minimize erosion and sedimentation of streams, provide wildlife habitats and provide shade to help moderate local temperatures. They form visual buffers and are scenic in their own right. Trees and woodlands are the most efficient means to control and mitigate the most common sources of water quality degradation and the problems this degradation causes for the Bay. Additionally, unlike some resources, trees have been given an explicit economic value – wooded lots for homes usually command more money than unwooded, open lots.

Forest Interior Habitat

Forest loss and fragmentation result in a continuing decline in forest interior habitat, which is usually defined as forest at least 300 feet from the forest edge. Forest interior habitats have moist soils and shade, whereas forest edge habitats have drier soils and more light.

Figure 6-1
Habitat Types



Source: Leedy, D.L. Planning for Wildlife in Cities and Suburbs, 1978.

The loss of forest interior habitat threatens the survival of species requiring this type of habitat, such as reptiles, amphibians and migratory birds. Forest interior species are often unable to survive in forest edge habitats and are not adapted to the presence of species that live in edge environments. Edge species can include crows, jays, opossums, raccoons, skunks, and domestic dogs and cats. These edge species are often predatory and can reduce the populations of forest interior species, such as low-nesting birds. Forest interior species benefit from protective measures for forest resources when a concerted effort is made to minimize forest fragmentation and preserve or create large tracts of forest.

The Forest Conservation Act

Since 1993, Howard County's Forest Conservation Act has attempted to mitigate forest loss caused by development (Figure 6-2). This Act works to limit the area of forest that is cleared for new development and includes reforestation requirements for forest that is cleared, although not on an equal area basis. Afforestation (that is, the planting of forest on an area that is presently without forest cover) is also required on sites that do not meet a minimum forest cover specification.

The Forest Conservation Act has been in place for seven years but there has been no comprehensive assessment of the effectiveness of the program. Forests throughout Howard County are still being lost to development, and remaining forests are often fragmented into small disconnected areas. Fragmented forests have reduced habitat value, particularly for sensitive species that require large areas of forest interior habitat.

An inventory of existing forest cover is needed that is more detailed than the DNR inventory. This detailed inventory will enable the County to prioritize retention and reforestation areas to minimize and correct forest fragmentation. This inventory could be used to direct the efforts of existing State programs to preserve forest land, to direct the efforts of private landowners and organizations, and to enhance implementation of the Forest Conservation Act. The inventory could also be used to extend protection to individual trees of historic significance.

Figure 6-2
Forest Conservation Achievements, 1993-1999

	1993/94	1995	1996	1997	1998	1999	Total
Number of Projects Subject to Act	39	69	45	47	51	77	**328**
Acres in Subject Projects	N/A	1,380	1,180	880	830	1,190	**5,460**
Acres of Existing Forest before Development[1]	250	490	470	280	360	500	**2,350**
Acres of Forest Retained after Development	141	260	260	160	160	240	**1,221**
Acres of Forest Cleared by Development	97	205	220	100	183	237	**1,042**
Acres of Forest Planted[2]	29	84	80	40	110	60	**403**
Acres of Forest Protected[3]	**170**	**340**	**310**	**180**	**240**	**430**	**1,670**

Source: Howard County DPZ

N/A Information not available.

1. Existing forests may include floodplain or preservation parcel forests that are not included in forests retained or cleared.
2. Forests planted are minimum acreages required to meet the Forest Conservation Act to compensate for clearing. Planting requirements vary based on land use, existing site conditions and amount of forest cleared.
3. Forests protected are actual acreages in forest conservation easements. Easement acres may exceed the minimum Forest Conservation Act requirements for retention and planting when property owners or developers elect to protect additional areas.

In addition to promoting forest conservation and reforestation, the use of native species for landscaping in residential and commercial developments should also be encouraged. Native plants are often hardier because they are adapted to local growing conditions and provide food and habitat for a variety of wildlife species. Because native species are often distinctive to a region, they can also promote a unique sense of place.

Protecting remaining native vegetation and creating new plant communities within and near developments requires many different techniques. Urban forestry principles are the basis for new approaches to landscape design and preservation in residential, commercial and employment areas. Urban forestry principles stem from an awareness that conditions in such areas are often greatly changed from the original natural processes that prevailed before development occurred. Techniques of preservation or mitigation in suburban developments must take fully into account different, often quite harsh, conditions such as the heat build-up near large paved areas.

Scrub-Shrub and Grassland Habitat

Scrub-shrub habitat, which may be either successional or permanent, is becoming less common in Maryland, since rural areas generally tend to be either forest or agricultural lands. The loss of this habitat is an important factor contributing to a significant population decline for migratory songbirds.

Grasslands were not extensive in precolonial times, but there was enough of this habitat to support a persistent population of grassland-dwelling birds. Grasslands can occur in naturally barren areas and may also have resulted from large forest fires, grass fires set by Native Americans, or flooding of riparian or streamside areas by beaver dams, which would have killed nearby affected trees. Since many of these processes no longer occur, this habitat has declined significantly and grassland-dwelling birds have suffered greater population declines than any other habitat-specific bird group.

Significant opportunities exist to create additional scrub-shrub habitat along utility corridors and along the edges between forests and fields. Forest and field often occur together along roads and in parks, farms, and urban and suburban backyards. A transition zone of scrub-shrub habitat can be created along the edges between forest and field which will provide the added benefit of reducing invasion by edge species into the forest.

Grassland birds require areas of at least 100 acres or more of grassland, which presents significant challenges to protecting this habitat type. However, management techniques such as locating smaller tracts of grassland close together with connecting strips between areas can protect and create larger areas of grasslands. Additionally, opportunities exist to establish grasslands on locations such as reclaimed sand and gravel mining areas and closed landfills.

Deer Management

In addition to the direct loss of forest acreage, an area of increasing concern is damage caused to existing forests by an overpopulation of deer. When deer exceed the carrying capacity of a forest, they eat the majority of understory vegetation, which consists of understory trees, shrubs and herbaceous vegetation. Impacts from this overgrazing of the understory can include a shift in understory species composition towards plants less favored as a food source by the deer, elimination of shrub and herbaceous species, a reduction in the populations of bird species that nest within understory habitat, and damage to the ability of the forest to regenerate. Additional problems associated with an overpopulation of deer can include damage to agricultural crops, commercial and residential landscaping, and an increase in deer-vehicle accidents.

Various management options exist for controlling deer populations, including fencing, using repellents, planting deer-resistant plants, hunting and contraception. These management options vary in effectiveness, cost and public acceptance.

In response to an increase in the deer population in Howard County, the County Council formally established a Deer Management Task Force in 1996. In July 1999, the Task Force issued a report that included findings about the deer situation in the County and the following recommendations for a comprehensive deer management program:

- Develop and implement a public outreach and education campaign about deer issues.
- Encourage private property owners to take appropriate actions to manage deer populations.
- Manage deer populations at acceptable levels on public lands.
- Address human safety and health concerns.

Policies and Actions

POLICY 6.5: Protect and restore woodlands and other native plant communities.

- ***Forest Resource Inventory.*** Develop an inventory of existing forest cover to prioritize retention and reforestation areas, to minimize and correct forest fragmentation. Use the inventory to guide implementation of the Forest Conservation Act.

- ***Forest Interior Habitat.*** Prioritize forest retention and reforestation areas, with a focus on maximizing forest interior habitat. Implement a program to establish and protect wildlife corridors that include forest interior habitat.

- ***Scrub-Shrub and Grassland Habitat.*** Initiate a program to establish and protect scrub-shrub and grassland habitat.

- ***Mitigation of Losses.*** Institute a restoration program based on principles of urban forestry and agricultural best management practices. Target efforts towards establishment of riparian forest buffers.

- ***Native and Invasive Exotic Plants.*** Endorse the use of native plants and discourage or prohibit the use of invasive exotic plants when landscape planting is required for new development.

- ***Deer Management.*** Institute a comprehensive deer management program, based on the recommendations of the July 1999 Deer Management Task Force report.

Threatened and Endangered Species

The 2000 Maryland Department of Natural Resources list of threatened and endangered species identifies 48 species within Howard County. Of these 48 species, 5 are animals and 43 are plants. The loss of species is primarily caused by habitat destruction, particularly of wetlands, riparian areas, steep slopes and forests. Therefore, protective measures for these important habitats also benefit these threatened and endangered species.

The DNR mapped the known habitat areas for the species in Howard County, and this map is used by the County for initial screening of development proposals. If this screening indicates that habitat for threatened and endangered species may be present, the developer is referred to the DNR for guidance on protecting the species and the associated habitat.

The DNR habitat map is based on information recorded from the mid-1980s to the present and may not have been field confirmed by DNR staff. Changes in habitat as a result of development may mean that currently mapped habitat may no longer be viable. Conversely, there may be areas of viable habitat that have not been delineated for protection.

Policies and Actions

POLICY 6.6: Enhance protection of threatened and endangered species.

- ***Threatened and Endangered Species List.*** Adopt the Maryland Department of Natural Resources (DNR) list of threatened and endangered species known to be found in Howard County. Work with the DNR to update information on threatened and endangered species currently present within the County.

- ***Development Regulations.*** Modify and better coordinate current regulations on forest conservation, wetlands, stream buffers and steep slopes, and criteria for open space acquisitions, to enhance habitat protection. Amend the review process to ensure that all proposed developments are screened for potential habitat, using the available DNR mapped information.

- ***Habitat Buffers.*** Work with the DNR to develop criteria to determine when species habitats are likely to be present and whether additional buffering beyond the protections provided by current regulations is appropriate. Refine the development regulations, where feasible, to ensure habitat, including any required buffer area, is included in protective easements or open space.

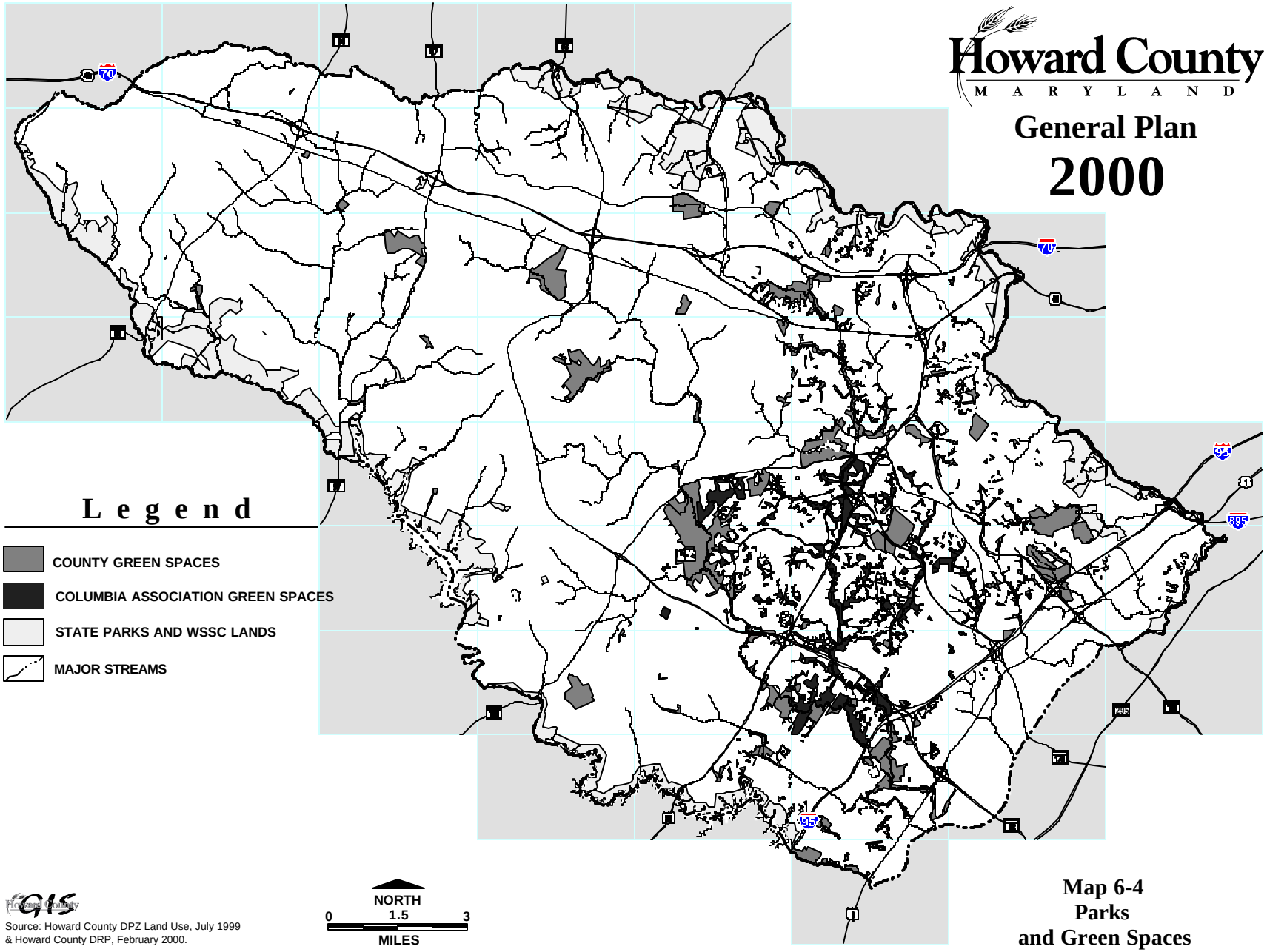
Green Space and Greenways

A Resource Protection Network

Several types of open space, easements, parks and other types of conservation areas have been designated within the County to protect specific environmental or landscape resources (Map 6-4). Ideally, the location and size of such protected "green space" areas should result in an extensive and continuous network of natural resources that protects critical ecosystem functions. Such a resource protection network should also be the basis for well-planned greenways. Greenways are protected corridors of green space maintained in a largely natural state for a variety of purposes, including safe passage for people and wildlife.

Within the Columbia New Town Zoning District, there is an extensive network of green spaces running through and between all neighborhoods, a system that fully incorporates many stream valley environments and gives the New Town much of its landscape character. In the rest of the County, however, no equivalent system has yet been completed. The main stems of the Patuxent and Patapsco Rivers and some of their key tributaries are fairly well protected. Other areas, however, lack an extensive green space network that incorporates all sensitive environments in a consistent way.

There is currently a lack of complete, well-developed information on the natural resources present within the County. This lack of data makes it difficult to assess the environmental value of these resources and establish environmental preservation goals and priorities. A County-wide environ-


Howard County
MARYLAND
General Plan
2000
Legend
COUNTY GREEN SPACES
COLUMBIA ASSOCIATION GREEN SPACES
STATE PARKS AND WSSC LANDS
MAJOR STREAMS
Source: Howard County DPZ Land Use, July 1999
& Howard County DRP, February 2000.
NORTH
0 1.5 3
MILES
Map 6-4
Parks
and Green Spaces

mental resource inventory is needed to guide development and implementation of resource protection networks.

Howard County is committed to looking at natural resource protection through a multifaceted system of protected areas. In planning and mapping for the system, the County will consider not only publicly owned acreage, but also historic and environmental easements, farmland easements, community association open space, reservoir areas and other privately owned protected areas. Planning for this system will include classification by type (for example, natural areas and passive recreation areas), as well as by community planning areas, so that demographic data can be related to green space and recreation needs.

The 1999 Howard County Comprehensive Recreation, Parks and Open Space Plan (R&P Plan), prepared by the Department of Recreation and Parks, guides green space planning. The 1999 R&P Plan identifies two regional greenways, the Patuxent and the Patapsco, and the following seven primary County greenways (Map 6-5):

- Long Corner Connector
- Cabin Branch
- Cattail Creek
- Middle Patuxent
- Little Patuxent
- Hammond Branch
- Deep Run

These primary greenways are located wholly within the County, predominantly along the County's major stream valley corridors. The development status of these greenways varies from potential to partially established. The regional greenways are partially established.

The 1999 R&P Plan includes a recommendation to develop a detailed greenway master plan, which could be used to guide the development review process. A detailed greenway master plan would identify and place priorities on specific lands and features to be included in the greenway system. The greenway master plan could enhance natural resource protection by identifying significant lands to achieve goals such as creating travel corridors for wildlife, connecting existing forest areas to create forest interior habitat, and protecting habitat for threatened and endangered species. The greenway master plan could also identify appropriate areas for public access and recreation. Increasing public access to natural areas can help build public appreciation and support for environmental protection.

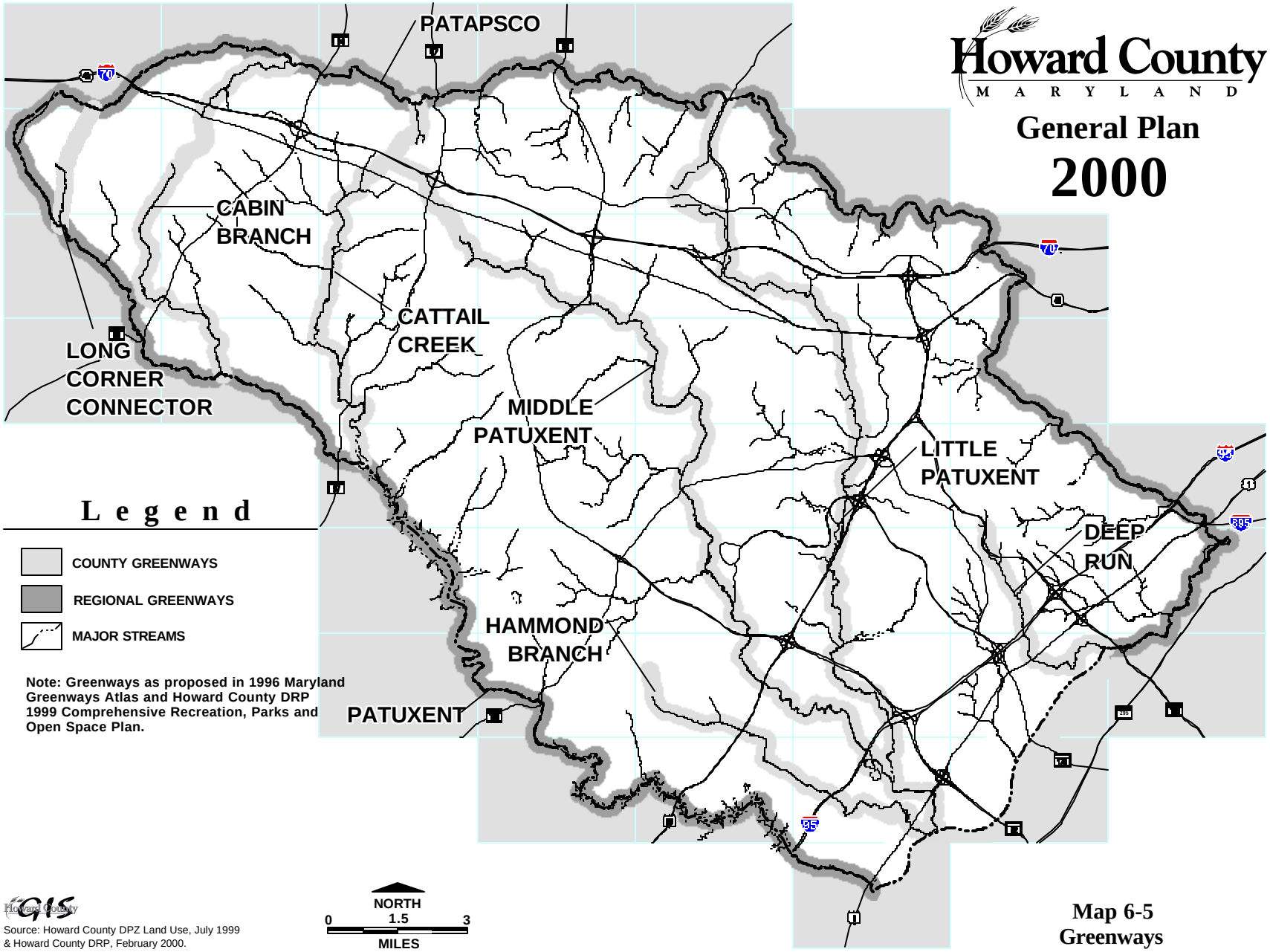
The 1999 R&P Plan also includes a recommendation to acquire upland green space. Upland green space would accommodate the creation of upland wildlife corridors and the development of recreational trails outside sensitive resource areas such as 100-year floodplains and stream and wetland buffers.

Green Space Planning in the Rural West

The Rural West, with its limited types and intensities of land uses, and remaining agricultural and woodland areas, forms a far different context and set of needs than the East. A basic General Plan commitment is to maintain the rural environment of the West. Green space planning strategies suited for the East will not maintain a rural environment. The clustering and agricultural and landscape preservation requirements described in Chapter 3, *Preservation of the Rural West*, provide a different approach in the West.

The rural clustering requirements are intended to protect the most significant agricultural, environmental and landscape resources during development. Still, there is the need to secure substantial green spaces in the West that are not protected through the subdivision of specific parcels. The acreages involved in green space preservation in the West are large and land costs are high. Creative use of purchased agricultural preservation easements, historic preservation easements, private donations to land trusts and the Conservation Reserve Enhancement Program can help this effort. The County has been successful in competing for funding for easement purchases through the State's new Rural Legacy Program and will continue to pursue grant funding in the future.

Because the majority of green space in the West is privately owned, public access for recreational use will be very limited. Public access can only be provided on lands that are in public ownership, unless the County obtains a right of public access from the homeowners association or from the private property owners.


Howard County
MARYLAND
General Plan
2000
PATAPSCO
CABIN
BRANCH
CATTAIL
CREEK
LONG
CORNER
CONNECTOR
MIDDLE
PATUXENT
LITTLE
PATUXENT
DEEP
RUN
HAMMOND
BRANCH
PATUXENT
Legend
COUNTY GREENWAYS
REGIONAL GREENWAYS
MAJOR STREAMS
Note: Greenways as proposed in 1996 Maryland Greenways Atlas and Howard County DRP 1999 Comprehensive Recreation, Parks and Open Space Plan.
Source: Howard County DPZ Land Use, July 1999
& Howard County DRP, February 2000.
NORTH
0 1.5 3
MILES
Map 6-5
Greenways

Green Space Planning in the East

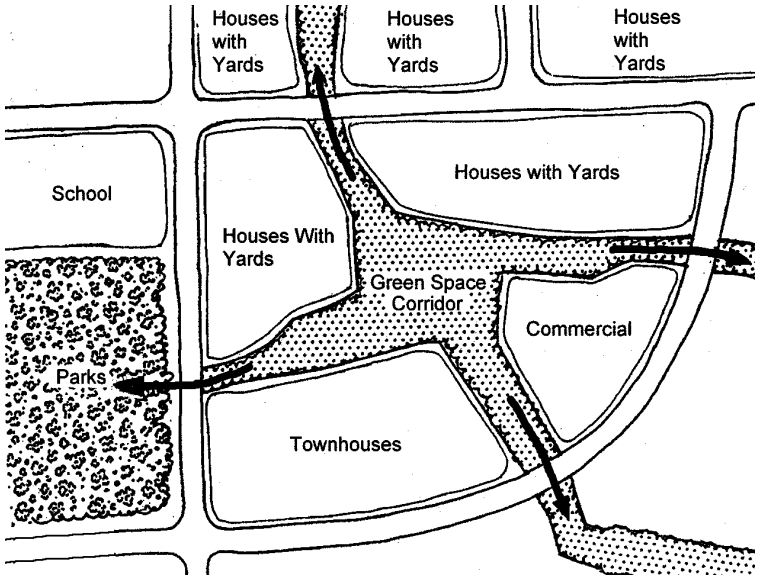
Nearly all of the County-owned green space is in the East. This makes good policy sense since most of the present and future population of the County will be living in the East, and one goal of the General Plan is to provide environmental and landscape resources close to people. Excluding the larger parks acquired as recreation or natural areas, existing green space holdings have generally been acquired through the subdivision process, in which separate open space lots are created and dedicated to the County for public use. Many resources have been protected, largely in stream valleys, but there is little continuity and few clear distinctions between open space acquired for resource protection and open space acquired for recreation needs.

The rapidly escalating cost of land in Howard County, especially in the East, further exacerbates the difficulties of the County's open space and parkland acquisition program. The shortage of land and the high price of available, appropriate acreage make it doubly important to pursue such acquisition aggressively. Two mechanisms which will be used to support these purchases are the County's reservation authority, which gives the County a three-year option on the purchase of parcels created through the subdivision process, and the State's Program Open Space fund. These mechanisms will be used to the maximum advantage for open space and parkland purchases in both the East and the West. Program Open Space funds are quite limited however, so pursuing an aggressive acquisition program will require additional sources of funding.

In the East, the main need is to fill in existing gaps in the current green space corridors along major streams and to bring resource areas of high value under public protection. As a priority, the County will investigate the opportunities for locating new County green space adjacent to existing public green spaces, such as the Patuxent River and Patapsco Valley State Parks. In addition to direct purchase and acquisition by dedication during subdivision, areas can also be acquired by donation, protected by easements or protected by long-term management agreements with private owners (Figure 6-3).

The East will have most of the County's present and future population, in addition to having almost all of the commercial, industrial and office development in the County. Even if environmental and landscape resources are set aside as green space holdings, they will remain under immense ecological pressure from adjacent or nearby development. Working with nature to mitigate impacts after as well as during development is crucial.

Figure 6-3
Continuity of Green Space Corridors



Continuity of green space corridors is a high priority.

Policies and Actions

POLICY 6.7: Meet County-wide green space needs.

- ***Environmental Resource Inventory.*** Develop a County-wide environmental resource inventory to guide development and implementation of environmental preservation goals and priorities.

- ***Greenway Master Plan.*** Develop a detailed greenway master plan to identify and place priorities on specific lands and features to be included in the County's greenway system. The plan should distinguish between portions of the network to be protected for environmental values and those that may have limited development for trails or other specific public uses.

- ***Environmental Analysis by Community Planning Areas.*** Use analysis of existing environmental and landscape resources and existing land use patterns within community planning areas to determine the best strategy for green space preservation for that area.

- ***Land Trusts for Environmental Protection.*** Encourage formation of local land trusts to protect environmental and landscape resources on private property.

- ***County-State Cooperation.*** Encourage State and County cooperation and funding to expand State and County green space adjacent to the Patapsco Valley and Patuxent River State Parks.

- ***Preservation Priorities for the Rural West and the East.*** In the Rural West, establish priorities for easement acquisition to fill gaps between existing protected areas, to increase continuity and to establish a critical mass of protected areas. In the East, establish priorities for fee simple acquisition to fill gaps in green space corridors and to protect sensitive resource areas.

- ***Conservation Easement Purchase Program.*** Examine ways of establishing a conservation easement purchase program to acquire easements in all regions of the County on land that may not qualify for the agricultural land preservation program but nevertheless merits preservation due to significant environmental or conservation value.

Development Issues

Working With Nature in Developing Areas

One underlying assumption of the General Plan is that development does not in and of itself mean the irretrievable loss of environmental and landscape resources. This assumption recognizes that suburban growth requires some alteration of the existing environment, but that the built environment can be designed and managed to retain or even enhance valuable environmental and landscape resources.

A key to the overall environmental health of the County is landscape design and engineering that works with nature to minimize the loss of resources, to reduce the off-site impacts of development, and to restore, where necessary, the environmental and landscape quality that may have been destroyed by past actions. Much of the environmental losses associated with development stem from two primary causes – removal of existing vegetation and changes in existing topography. The disturbances associated with clearing and grading lead to the most common environmental problems associated with development – increased runoff, accelerated erosion, transportation of sediments and nutrients into streams and rivers, and loss of wildlife habitats. Minimizing the need to clear and grade is, therefore, one of the keys to maintaining the environmental quality of developed areas (Box 6-1).

Existing Regulations

It would be unfair to blame all the problems cited in Box 6-1 on developers and site planners. Although the developer of houses on hilly terrain can choose housing types that better fit the topography, the road grade limitations also require extensive alterations of existing topography. Because of minimum lot widths required by the Zoning Regulations, roads may have to be longer to accommodate the number of units needed to make the project economically sound. Because houses are sited to fit the road network and in some cases are tightly clustered to minimize site disturbance, the result may be houses that are poorly oriented to the sun. Other examples can be cited.

Box 6-1

Common Environmental Losses From Site Development

This issue is perhaps best illustrated by citing common situations which, while meeting all current regulations such as minimum stream and wetland buffers, do not work well with nature:

- Although a site is relatively flat, the desire to market large houses with walkout basements leads to much cutting and filling of the existing topography. While an effort is made to save the best of the tall oaks and tulip trees that are on the site, compaction and filling around the roots and altered drainage patterns gradually lead to the weakening, death and removal of these trees.
- Residential development in hilly terrain uses the same popular house types that are originally designed for flat or less sloping land. The existing topography has to be greatly altered to accommodate these homes. In the process, much existing natural vegetation is lost.
- Although a dense stand of trees and underbrush could be saved, the developer removes much of the shrubbery and smaller trees to make the project "more attractive" with large open lawns and some ornamental flowering trees and shrubs. A valuable local habitat is lost. There is also a noticeable increase in stormwater runoff.
- Regrading a site to collect and direct stormwater runoff to a large stormwater management facility alters existing hydrology and increases downstream erosion.
- Although total open space acreage requirements are met on a project, construction activities, clearing and regrading, introduction of stormwater management facilities, setback requirements and poor distribution of the required open space within the development eliminate most of the original environmental and landscape character that existed.
- Road layout of a new subdivision forces houses to be oriented so their main rooms face north or west, making the houses colder in winter and hotter in the summer than they need be. No attempt is made to coordinate landscape design and orientation for greater comfort and light.

Since 1990, the development regulations have been revised to address some of these concerns. The Zoning Regulations now permit somewhat decreased minimum lot widths. Residential road design standards have been revised to increase the maximum allowable grade of a road and to permit narrow streets and smaller turning radii. These revised regulations help reduce the disturbance of natural features during construction and reduce roadway impervious surfaces. Additionally, stream and wetland buffer requirements, protections for steep slopes, the Forest Conservation Act and rural cluster development have helped reduce the removal or drastic modification of original environmental and landscape elements.

Zoning and development requirements originated from concepts of land use regulation based on the goals of maintaining property values and establishing equitable regulation of similar properties. These goals are to be achieved by requiring consistency in the allowed uses and in the size and location of improvements on individual lots within a given zoning district. Minimum lot sizes, minimum lot widths, minimum setbacks and other bulk regulations are imposed to achieve this end. However, uniformity ignores the fundamental premise of working with nature – that no two sites are exactly alike. Indeed, even adjacent properties can have sharply different existing conditions.

Zoning, subdivision and site development requirements in the County Code must protect the environment, while also providing flexibility to allow developers and builders to better match their proposals to the environmental and landscape resources of their sites. Three residential zoning categories presently address environmental and green space concerns (Box 6-2). These categories should be refined to further enhance their effectiveness in protecting resources. Each of these residential zoning districts promotes tightly clustered lots to limit site disturbance. This type of clustering provision may also be appropriate to enhance environmental protection in other residential zoning districts.

Much of the remaining undeveloped residential land in the East is located

Box 6-2

Residential Zoning Districts That Address Environmental Concerns

The Residential - Environmental Development (R-ED) zoning district was adopted in 1982 as a substitute for conventional half-acre minimum lot zoning in the environmentally sensitive areas surrounding Ellicott City. Developers in the R-ED zone are permitted only two units per net acre and are allowed to cluster units on smaller lots to keep development impacts such as clearing and grading away from sensitive steep slopes and stream valleys. In 1993, this district was also placed along the main stem of the Patapsco River between Ellicott City and Elkridge, south of the Middle Patuxent River near I-95, and on a few smaller infill parcels located elsewhere in the East to protect environmentally sensitive and historic features.

In 1993, two new zoning districts were established in the Rural West to specifically address agricultural lands and natural resource protection. The Rural Conservation (RC) zoning district was established to conserve farmland and natural resources, while allowing low density, clustered residential development. The Rural Residential (RR) zoning district was established to allow low density residential development to continue within an area already largely subdivided. Cluster subdivision is allowed to protect natural resources and agricultural lands.

These western zoning districts also have a Density Exchange Option (DEO) overlay district. This zoning overlay district allows the exchange of residential density between parcels in the RC-DEO and RR-DEO Districts, to encourage the clustering of residential development outside agricultural lands and natural resource areas.

in small, infill sites that are surrounded by adjacent development. These sites are often still undeveloped because they contain numerous environmentally sensitive features such as steep slopes, streams, wetlands and forest. The current zoning on these sites may not afford adequate protection for environmental resources or ensure that the new development is compatible with surrounding development. Use of Residential-Environmental Development (R-ED) zoning provisions should be considered for these areas.

Development requirements and/or incentives should also be instituted for better resource protection in higher density residential developments and commercial, office and manufacturing areas. These could include limits on the amount of disturbed area, enhanced design of stormwater management, phasing of construction and/or a maximum percentage of impermeable surfaces.

The Subdivision and Land Development Regulations contain a series of separate protection measures for individual resources. However, guidance is not provided for resolving conflicts that may occur between these individual measures and other development requirements such as the provision of stormwater management. Natural resource protection in the County could be enhanced by the development of an environmental guidelines handbook that provides one source to list and explain all policies and guidelines for the protection of natural resources. The handbook could also provide technical guidance, including detailed criteria and methods for implementing resource protection, and comprehensive guidance for coordinating natural resource protection issues and resolving conflicts. Such a handbook would be a valuable source of information for County staff, consultants, developers and citizens, and provide guidance in the application of natural resource protection policies, based on the type and value of the resource present.

Inspection and Enforcement

Inspection and enforcement to ensure regulatory compliance is a key component of environmental protection, particularly during initial site development. Limits of disturbance must be strictly observed to protect on-site resources such as wetlands, streams and forest. Sediment and erosion control measures must be properly installed and maintained to protect both on- and off-site water resources.

Construction site inspections are currently performed by five divisions in three agencies, with each division assigned to review a specific component of the development, such as sediment and erosion control or stormwater management. This distribution of inspection responsibilities is not efficient and has created gaps in the construction inspection process.

There are also gaps in the construction completion inspection process. For example, inspections to ensure compliance with required plantings for the Forest Conservation Act and the Landscape Manual rely on self-certification by the developer. This system is not consistently reliable. These gaps and deficiencies in the County's site inspection and enforcement system need to be analyzed in greater detail to specify the problems and define the most appropriate solutions.

Policies and Actions

POLICY 6.8: Secure better protection of environmental and landscape resources within new developments.

- ***Expansion of Residential-Environmental Development Zoning.*** Refine the Residential - Environmental Development (R-ED) zoning district requirements and expand the use of this district in the eastern portion of the County, particularly on infill parcels, to enhance sensitive resource protection.

- ***Environmentally Sensitive Development in other Single-Family Residential Zoning Districts.*** Encourage more environmentally sensitive design in residential zoning districts other than the R-ED District. Promote the use of smaller, tightly clustered lots to limit site disturbance and maximize open space for natural resource protection.

- ***Higher Intensity Development.*** Institute development requirements and/or incentives for better resource protection in higher density residential developments and commercial, office and manufacturing areas.

- ***Environmental Guidelines.*** Prepare an environmental guidelines handbook to provide comprehensive guidance on resource protection.

- ***Enforcement of Environmental Protection Regulations.*** Conduct a performance audit of the site inspection and enforcement process to better define enforcement problems and implement measures to address these problems.

Energy Conservation

Although the oil crises of the 1970s and early 1980s have faded, energy conservation is still an important issue. Past attention centered on the availability of gasoline. Current concerns focus on fossil fuel combustion as a major source of air pollution and "greenhouse gases" such as carbon dioxide. Although research is not conclusive, there is widespread concern that the build-up of greenhouse gases in the upper atmosphere may lead to global warming and climate change.

Air pollution can cause health problems for humans and animals, crop damage and the destruction of the ozone layer in the upper atmosphere, which shields the earth from harmful ultraviolet radiation. In addition, air pollution contributes to nutrient and toxic pollution in the Chesapeake Bay. It is estimated that air pollution contributes 25% of the nitrogen that enters the Bay.

The northeastern portion of Maryland, including Howard County, is designated as a severe nonattainment area for ozone. Under the requirements of the Federal Clean Air Act, this region has until 2005 to achieve substantial reductions in air pollution emissions. These reductions must be achieved even as emissions increase as a result of population growth and development.

Conserving fossil fuel resources increases our options for meeting future energy needs while reducing both current expenditures for energy and environmental impacts. For example, reducing private automobile use means less gasoline is burned, which also reduces air pollution. Improving opportunities for bicycle and pedestrian travel, encouraging the use of transit and ridesharing, and reducing commuter traffic by encouraging County residents to fill job openings within the County are addressed in Chapter 2, *Responsible Regionalism*; Chapter 4, *Balanced and Phased Growth*; and Chapter 5, *Community Conservation and Enhancement*.

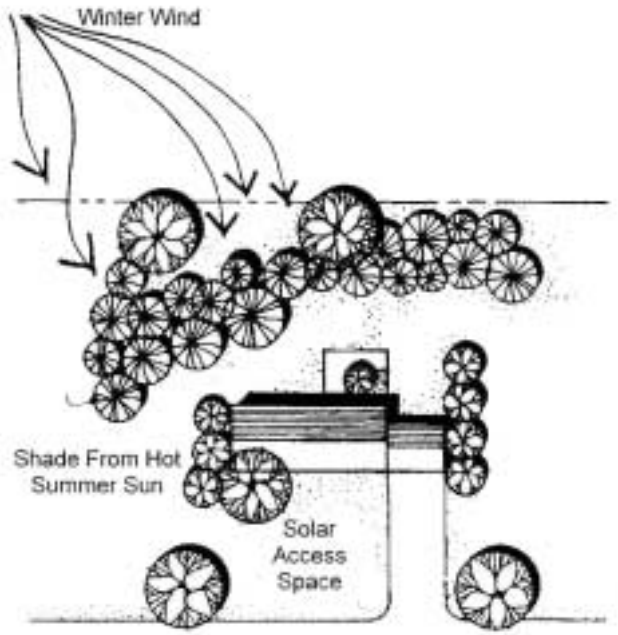
Land use planning and site design can work with nature to create more energy efficient development. Actual cost reductions may not necessarily be spectacular, but more comfortable homes and outdoor activity areas can be

secured thanks to proper sun orientation, significant windbreaks, shading of buildings and streets in summer, and advantageous use of natural breezes (Figure 6-4). Street patterns, existing topography, adapting the type of architecture used to the site, and retention or selective clearing of vegetation all affect the ability to design energy conscious developments.

The Maryland Department of Natural Resources recently developed a Green Building Program to encourage the use of environmentally responsible construction. The program promotes the conservation of energy, water and other natural resources through the use of energy and water efficient products and designs, alternative recycled building materials and low impact site designs. The program promotes a Green Building Certification Program in collaboration with the Suburban Maryland Building Industries Association, and conducts training workshops and educational seminars for developers, architects and local government officials. The County may wish to consider working with the DNR to promote the Green Building Program within Howard County, as a means to encourage the use of energy conscious site planning and design practices.

Significant energy conservation can also be achieved through the cumulative effect of many small measures in individual daily lives. These measures can range from planting trees to providing shade for homes to choosing energy efficient appliances. While most energy conservation decisions will be made by private individuals and businesses, the County can set an example and provide information and perhaps incentives to encourage others.

Figure 6-4
Energy Conscious Site Planning



Source: Energy-Conscious Development: Options for Land Use and Site Planning Regulations, 1981.

Policies and Actions

POLICY 6.9: Promote the use of energy conscious planning and design, and secure the environmental benefits of energy conservation, including a reduction in air pollution.

- ***Transit's Conservation Benefits.*** Make energy conservation part of all cost/benefit evaluations of proposals for public transit service expansion.

- ***Regulations to Encourage Conservation.*** Review the Zoning and the Subdivision and Land Development Regulations to incorporate energy conscious land use and site planning practices.

- ***Energy Conservation Landscaping.*** Incorporate energy conscious landscape design principles into the Landscape and Forest Conservation Manuals.

- ***Green Building Program.*** Identify measures to encourage building design and construction that conserves energy, water and natural resources.

- ***Public Outreach and Education.*** Work with regional and State agencies and organizations to conduct public outreach and education on the importance of energy conservation.

Environmental Implications of County Actions

Responsibility for using more environmentally conscious facility design, construction and management practices also applies to the activities of local government agencies. By implementing environmentally sensitive site development and property management practices, and demonstrating their effectiveness, the County can also encourage their use by others. These practices can include a variety of activities, such as using integrated pest management on County-owned sites to reduce the use of pesticides and herbicides, retrofitting environmental and landscape resources on select County-owned sites that have been greatly disturbed or lack environmental features, such as stormwater management or minimum stream buffers, and incorporating energy conservation site planning and design techniques in County projects.

Policies and Actions

POLICY 6.10: Incorporate environmentally sensitive site development and property management practices into County activities.

- ***Site Development Criteria.*** Make environmental sensitivity a key concern in the selection and development of sites for future County facilities such as schools, recreation facilities, libraries and government offices. Incorporate Green Building practices into facility design and construction.

- ***Stormwater Management.*** Use low impact development practices, including bioretention facilities, when designing new stormwater management and retrofitting stormwater management for County facilities.

- ***Land Management Practices.*** Incorporate environmentally conscious landscape management practices for County facilities, open space and parkland.

- ***Restoration and Enhancement of Water Quality and Wildlife Habitat.*** Undertake water quality and wildlife habitat restoration, creation and enhancement activities on County-controlled land.

- ***Demonstration Projects.*** Promote environmentally sensitive County projects to demonstrate the effectiveness of environmentally sensitive management practices and to encourage their use by others.

- ***Limits to Right-of-Way Disturbance.*** Limit the right-of-way disturbance for installation and maintenance of utilities and roads.

- ***Road Cleaning.*** Expand the road cleaning program, which reduces the amount of debris, sediment, nutrients and pollutants that may be washed into streams and rivers, from twice a year to six times a year by 2010.

Mineral Resources

A study completed in 1981 by the Maryland Geological Survey identified Howard County's principal mineral resources as sand and gravel, materials of great importance to the construction industry. A map produced as part of the Maryland Geological Survey study (dated 1979 and still the most accurate map available) illustrated locations which have the potential for sand and gravel resource development. These resources are confined, for the most part, to the Coastal Plain portion of the County. This resource area stretches from the Howard and Anne Arundel County border westward to a line running northeast to southwest, approximately midway between MD 29 and I-95. The Maryland Geological Survey also indicates that there is potential for crushed stone production west of I-95, based on mineral resources endemic to the Piedmont region of Howard County, but the locations of the deposits have not been identified, mapped or mined.

The 1981 study identified a number of factors which served to constrain or limit the mining industry in Howard County, including urbanization, prohibitive property values, incompatible zoning, legal restrictions, easements and the environmental concerns associated with surface mining. The report indicated that as these influences continued to affect the industry, closings would take place and the County's sand and gravel needs would eventually be met by importing the materials from other counties. That, in fact, has occurred.

The Water Management Administration of the Maryland Department of the Environment, which issues mining permits under the jurisdiction of the Surface Mining Act of 1975, currently identifies only one mining operation in Howard County. That facility, which quarries natural building stone, had less than seven acres in operation as of February 2000. Sand and gravel are no longer quarried in Howard County, however, a special exception was recently granted for a stone mining operation in an area east of I-95. This business is still seeking additional Federal, State and County approvals prior to beginning operation.

There are perhaps a few areas in the East presently not developed that have sand and gravel resources which potentially could be mined. While the extraction of the mineral resources would provide needed raw materials for the construction industry, such operations would have to be conducted in an environmentally sensitive fashion, cognizant of the impacts on the surrounding community.

Restrictions on mining operations are incorporated in State permitting procedures and in the County's Zoning Regulations, which allow sand and gravel operations only as special exceptions in rural and industrial areas, subject to extensive conditions. Mining operations are not permitted in residential districts other than rural districts. Proper pre-and post-extraction planning, in addition to proper ongoing management, is required to ensure that mining operations do not negatively affect the quality of life of the immediate neighborhood and that existing infrastructure (such as roads) can accommodate the increased demand. Final use of a mined site must be considered and planned prior to initiation of extraction. If the above conditions are met, the extraction of sand and gravel resources could be the first phase in the overall development of a site.

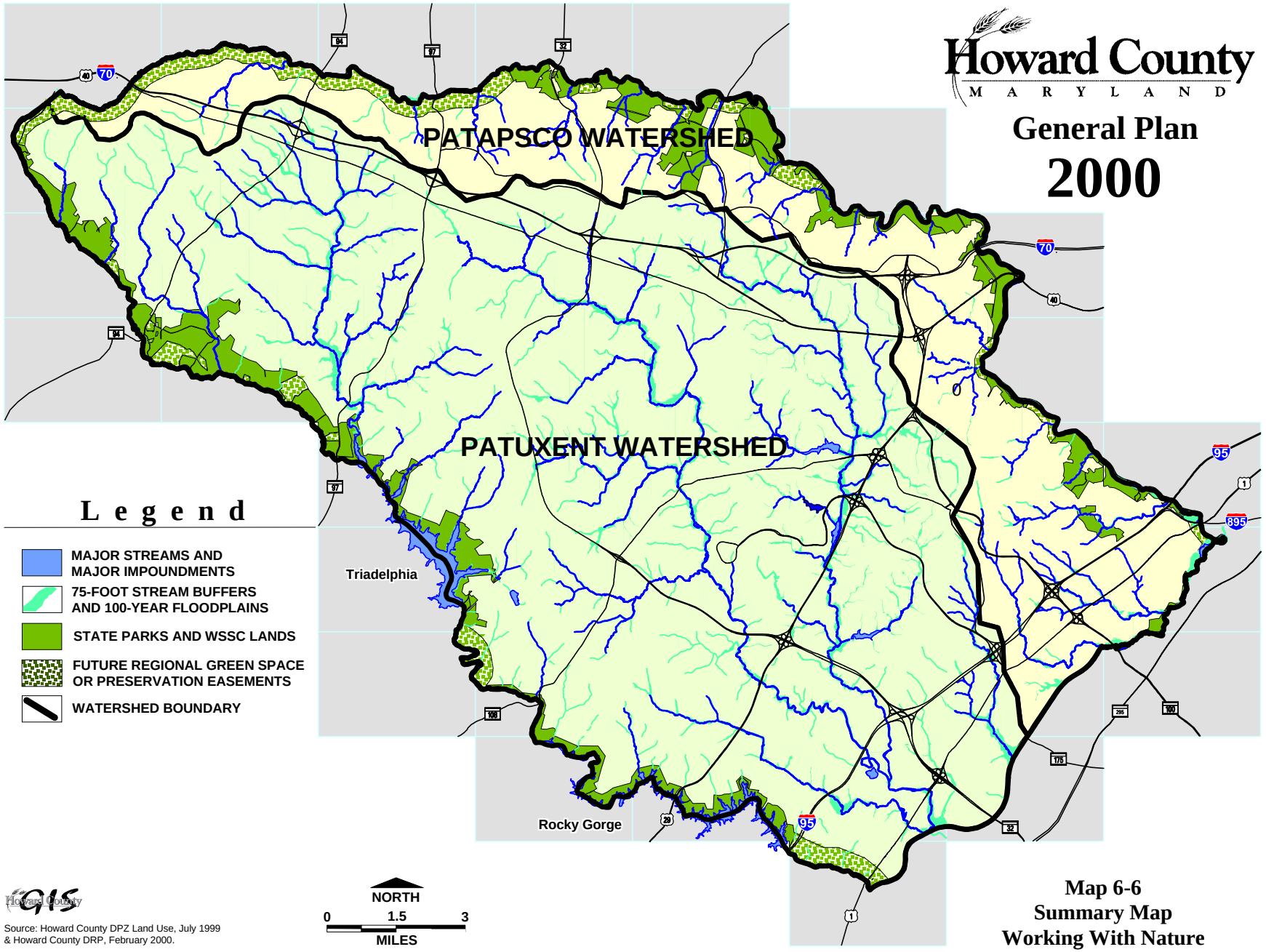
Policies and Actions

POLICY 6.11: Balance mineral extraction with other land uses.

- ***Mineral Resource Inventory.*** Compare the location of known mineral resources with undeveloped parcels, analyze the value and accessibility of the resource, and determine measures to prevent preemption of extraction, where warranted.

Summary Map

Map 6-6, titled Summary Map – Working with Nature, summarizes and illustrates some of the policies and actions described in this chapter.


Howard County
MARYLAND
General Plan
2000
PATAPSCO WATERSHED
PATUXENT WATERSHED
Triadelphia
Rocky Gorge
Legend
MAJOR STREAMS AND MAJOR IMPOUNDMENTS
75-FOOT STREAM BUFFERS AND 100-YEAR FLOODPLAINS
STATE PARKS AND WSSC LANDS
FUTURE REGIONAL GREEN SPACE OR PRESERVATION EASEMENTS
WATERSHED BOUNDARY
Howard County GIS
Source: Howard County DPZ Land Use, July 1999
& Howard County DRP, February 2000.
NORTH
0 1.5 3
MILES
Map 6-6
Summary Map
Working With Nature